

REMARKS

Claims 1-4, 6-12, 14-17 and 33-34 are pending. Claims 5, 13, 18-32 and 35-39 are cancelled. Claims 1, 10, 15 and 33 have been amended. Reconsideration and allowance of the pending claims is respectfully requested.

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Claim Objections

Claims 5 and 13 have been cancelled, thereby obviating the objections. Withdrawal of the objections is respectfully requested.

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Claim Rejections §§ 102(b) and 103(a)

Claims 1-9 and 33-34 were rejected under 35 U.S.C. § 102(b) as being anticipated by United States Patent Number 5,668,033 to Ohara et al. (hereinafter "Ohara"). Claims 10-17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Ohara in view of United States Patent Number 6,118,181 to Merchant et al. (hereinafter "Merchant"). The Applicant has amended Claims 1, 10, 15 and 33, which will be described in greater detail after discussion of the references.

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The References

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Ohara describes a method for manufacturing a semiconductor acceleration sensor device by "covering a movable portion by use of a cap". *See Ohara, Col. 1, Lines 51-52.* Ohara describes the bonding of the cap as follows:

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Also, preferably, a gold (Au) film is adhered to the leg portion of the cap forming wafer. Where the bonding frame is made to be formed using silicon (Si), when in the bonding step heating is performed up to a temperature higher than an Au/Si eutectic temperature, the gold film comes to function as a bonding layer, with the result that it

is possible to obtain a tough bondage easily. Further, when the gold film is also adhered onto the inner surface of the cap, the gold film can be also made to function as an electromagnetic shielding layer. *Ohara, Col. 2, Lines 23-32.*

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Thus, Ohara merely describes a cap which is bonded using a gold film. The cap described in Ohara merely serves to protect the movable portion of the semiconductor acceleration sensor. The gold film is utilized as a bond via a eutectic technique and may function as an electromagnetic shield. Nowhere
10 does Ohara disclose, teach or suggest an integrated circuit in the cap.

Merchant describes a system and method for bonding wafers. Although Merchant describes integrated circuits on two wafers, Merchant recites that "most conventional wafer bonding processes are not suitable for bonding wafers that include CMOS circuitry and other temperature sensitive
15 components because the relatively high temperatures associated with the bonding process can damage the CMOS circuitry or other temperature sensitive components." *See Merchant, Col. 1, Lines 34-39.* Merchant then describes an instance of such an undesirable and unacceptable bonding technique in the following excerpted portion:

20 In addition, it is often undesirable to use eutectic bonding in order to bond two wafers together because the existence of liquid phases in these processes can sometimes lead to rapid dissolution of underlayers and, hence, a loss of process control. Furthermore, maintaining precise
25 separation distances between two wafers bonded via eutectic bonding can be difficult since the surfaces of the eutectics typically deform when a temperature close to the eutectic's melting point is reached. *Merchant, Col. 1, Lines 52-62.*

30 Consequently, Merchant describes a bonding process that uses palladium in response to the undesirability of eutectic bonding. Merchant also cautions that "one skilled in the art should realize that substituting for the silicon and/or

palladium may affect the temperatures associated with the bonding process”.
See Merchant, Col 6, Lines 24-23 and 17-19. Therefore, Merchant explicitly cautions against the use of materials other than palladium and against the use of eutectic bonding.

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The Claims

Claim 1 has been amended, and as amended (portions of the amendment appear in bold italics below) recites an electrical device comprising “first and second substrates *having respective first and second integrated circuits*” and
10 “a bond structurecomposed of noble metal ... [and] *configured to form an electrical connection between the first integrated circuit and the second integrated circuit*”. Support for the amendment may be found throughout the specification and drawings as filed, such as at page 10, paragraph 31 of the subject application. Neither Ohara nor Merchant, alone or in combination,
15 disclose, teach or suggest the above excerpted limitations as claimed in amended Claim 1.

Claim 10 has been amended, and as amended (portions of the amendment appear in bold italics below) recites an electrical device comprising “first and second semiconductor wafers each including a plurality of integrated
20 circuits”, “the silicon layer on the first semiconductor wafer is bonded to the second semiconductor wafer by gold alloyed with an oxide affinity material”, and “*the gold alloyed with the oxide is configured to provide an electrical connection between at least one said integrated circuit of the first semiconductor wafer with at least one said integrated circuit of the second*
25 *semiconductor wafer*”. Support for the amendment may be found throughout the specification and drawings as filed, such as at page 10, paragraph 31 of the subject application. Neither Ohara nor Merchant, alone or in combination,

disclose, teach or suggest the above excerpted limitations as claimed in amended Claim 10.

Claim 15 has been amended, and as amended (portions of the amendment appear in bold italics below) recites an electrical device comprising

5 “first and second semiconductor wafers each including a plurality of integrated circuits”, and “the first semiconductor wafer is bonded to the second semiconductor wafer by the gold alloy that is bonded to the silicon on the first semiconductor wafer *such that the gold alloy is configured to provide an electrical connection between at least one said integrated circuit of the first*

10 *semiconductor wafer with at least one said integrated circuit of the second semiconductor wafer*”. Support for the amendment may be found throughout the specification and drawings as filed, such as at page 10, paragraph 31 of the subject application. Neither Ohara nor Merchant, alone or in combination, disclose, teach or suggest the above excerpted limitations as claimed in

15 amended Claim 15.

Claim 33 has been amended, and as amended (portions of the amendment appear in bold italics below) recites an electrical device comprising

“first and second substrates bonded together with a first material having dispersed therein a reducing agent for the diffusion therein of oxidation of a

20 second material” and “*the first material having the dispersed reducing agent is configured to form an electrical connection between a first integrated circuit on the first substrate with a second integrated circuit on the second substrate*”. Support for the amendment may be found throughout the specification and drawings as filed, such as at page 10, paragraph 31 of the

25 subject application. Neither Ohara nor Merchant, alone or in combination, disclose, teach or suggest the above excerpted limitations as claimed in amended Claim 33.

As previously described, Ohara describes a method for manufacturing a semiconductor acceleration sensor device by "covering a movable portion by use of a cap". *See Ohara, Col. 1, Lines 51-52.* The cap described in Ohara merely serves to protect the movable portion of the semiconductor acceleration sensor. The gold film is utilized as a bond via a eutectic technique and may function as an electromagnetic shield. Nowhere does Ohara disclose, teach or suggest an integrated circuit in the cap and therefore cannot disclose, teach or suggest using the bond to communicatively couple integrated circuits on each of the wafers. Indeed, the Office correctly asserts that Ohara does not "explicitly disclos[e] the plurality of integrated circuit[s] on each [of the] wafers". *See Office Action Dated April 28, 2004, Page 5.*

The Office then asserts Merchant to correct the defects of Ohara, namely the failure of Ohara to provide for integrated circuits on both substrates. As previously described, Ohara discloses a gold film that is utilized to form a bond via an eutectic technique. Merchant, however, describes that it is often undesirable to use eutectic bonding techniques, as shown in the following excerpted portion:

In addition, it is often undesirable to use eutectic bonding in order to bond two wafers together because the existence of liquid phases in these processes can sometimes lead to rapid dissolution of underlayers and, hence, a loss of process control. Furthermore, maintaining precise separation distances between two wafers bonded via eutectic bonding can be difficult since the surfaces of the eutectics typically deform when a temperature close to the eutectic's melting point is reached. *Merchant, Col. 1, Lines 52-62.*

Consequently, Merchant describes a bonding process that uses palladium in response to the undesirability of eutectic bonding. Merchant also cautions that "one skilled in the art should realize that substituting for the silicon and/or

palladium may affect the temperatures associated with the bonding process".
See Merchant, Col 6, Lines 24-23 and 17-19. Because Merchant explicitly cautions against the use of materials other than palladium and against the use of eutectic bonding as described by Ohara, the combination of Merchant and
 5 Ohara would not result in an electrical device having the above-listed claim limitations of Claims 1, 10, 15 and 33. For instance, the eutectic bonding techniques of Merchant for attaching a cap would not result in first and second substrates, each having integrated circuits that are communicatively coupled via the bond because Merchant cautions against the use of eutectic techniques
 10 when attaching two substrates having integrated circuits. Thus, a combination of the gold bonded cap of Ohara with the palladium bond of Merchant would not result in the claimed limitations as described above.

Claims 2-4 and 6-9 depend from independent Claim 1. Claims 11, 12 and 14 depend from independent Claim 10. Claims 16-17 depend from
 15 independent Claim 15. Claim 34 depends from independent Claim 33. Each of these claims is allowable based on their respective dependencies as well as their own recited features which are not disclosed, taught, or suggested by Ohara or Merchant, alone or in combination.

Conclusion

For at least these reasons, Claims 1-4, 6-12, 14-17 and 33-34 are allowable and furtherance to issuance is respectfully requested.

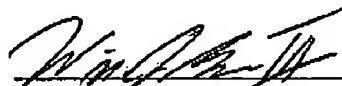
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Respectfully submitted,

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